IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	§	
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Jonathan M. Owen et al.	§	Group Art Unit: unassigned
	§	
Prior Application Serial No.: 09/826,262	§	
	§	
Prior Application Filed: April 4, 2001	§	Examiner: unassigned
	§	
Serial No.: Unassigned	§	
	§	
Filed: Herewith	§	Atty Docket: ALPH:0006
	§	TT4413
For: SYSTEM AND METHOD OF MAINTAINING COHERENCY IN A DISTRIBUTED COMMUNICATION SYSTEM (As Amended)	§	

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4/23/01 — *Date*

Jennifer Presswood — *Jennifer Presswood*

Assistant Commissioner
For Patents
Washington, D.C. 20231

Dear Sir:

PRELIMINARY AMENDMENT

This Preliminary Amendment accompanies a Request for Filing a Continuation Application Under 37 C.F.R. § 1.53(b). The application claims priority to previously filed application serial number 09/826,262, filed April 4, 2001, by the same inventors. Prior to examination of the continuation application, please enter the following amendments:

IN THE TITLE:

Please replace the title of the application with:

-- SYSTEM AND METHOD OF MAINTAINING COHERENCY IN A DISTRIBUTED COMMUNICATION SYSTEM --

IN THE CLAIMS:

Please add new claims 44-99 as follows:

44. A method of maintaining order of transactions in a distributed communication system, the distributed communication system comprising a plurality of nodes interconnected by a plurality of communication links, the plurality of nodes having access to a plurality of addressable memory locations, the plurality of nodes comprising a source node and a target node, the method comprising the acts of:

dispatching, by the source node, a first request directed to a first memory address accessible by the target node;

transmitting, from the target node, a first response directed to the source node in response to the first request;

transmitting, from the source node, a second response directed to the target node after receipt of the first response; and

stalling service, by the target node, of a second request directed to the first memory address pending receipt of the second response.

45. The method as recited in claim 44, wherein the first request is associated with a first transaction, and the act of transmitting the first response is performed after the first transaction has reached a memory commit point.

46. The method as recited in claim 45, wherein the act of transmitting the second response is performed after the first transaction has reached a processor commit point.

47. The method as recited in claim 45wherein the first transaction is a write transaction, wherein the first response is a Target Done response, and wherein the second response is a Source Done response.

48. The method as recited in claim 44, wherein the first request comprises a read request, and wherein the first response comprises a read response.

49. The method as recited in claim 44, wherein the first request is associated with a first transaction, and the method comprises the act of:

stalling, by the source node, dispatch of a second transaction pending receipt of the first response.

50. The method as recited in claim 44, comprising the acts of:

issuing, by the target node, a probe in response to the first request, the probe being directed to each of the plurality of nodes to determine whether any of the plurality of nodes is caching data corresponding with the first memory address; and

issuing, by each of the plurality of nodes, a third response in response to the probe,

wherein act of transmitting the second response, from the source node, is performed after receipt of all of the third responses.

51. The method as recited in claim 50, wherein each of the third responses is directed to the target node, and wherein the act of transmitting the first response directed to the source node is performed after receipt of all of the third responses by the target node.

52. The method as recited in claim 50, wherein each of the third responses is directed to the source node.

53. The method as recited in claim 50, wherein one of the third responses is a read response, the read response indicating that the node which issued the read response is storing data corresponding to the first memory address.

54. The method as recited in claim 50, wherein the first request comprises a read request, and wherein if the probe determines that a first node of the plurality of nodes is caching data corresponding to the first address, then the method comprises the act of:

issuing, by the first node, a memory cancel response directed to the target node to cancel a memory access by the target node to the first memory address.

55. The method as recited in claim 54, comprising the acts of:

canceling the memory access; and

issuing by the target node a target done response directed to the source node in response to the memory cancel response.

56. The method as recited in claim 54, wherein the act of issuing the third response by the first node in response to the probe comprises the acts of:

formatting the third response to indicate the issuance of the memory cancel response by the first node; and

formatting the second response to indicate the issuance of the memory cancel response.

57. The method as recited in claim 56, wherein the act of stalling service of the second request comprises stalling service pending receipt of the memory cancel response by the target node.

58. The method as recited in claim 44, wherein the source node comprises a processor.

59. The method as recited in claim 44, wherein the source node comprises a host bridge.

60. The method as recited in claim 44, wherein the target node comprises a memory controller configured to access the first memory address.

61. A method of maintaining order of transactions issued in a distributed communication system, the distributed communication system comprising a plurality of nodes interconnected by a plurality of communication links, the plurality of nodes configured to access a plurality of addressable memory locations for storing data, the plurality of nodes comprising a source node and a target node, the method comprising the acts of:

storing at the target node a first request received from the source node and directed to a first memory address;

storing at the target node a second request directed to the first memory address;

servicing the first request;

transmitting a communication to the source node in response to the act of servicing the first request; and

stalling an act of servicing the second request pending receipt by the target node of a source response transmitted from the source node in response to the communication.

62. The method as recited in claim 61, wherein the acts of storing the first request and the second request at the target node comprises the act of ordering the first request and the second request in a queue in the order in which the first request and the second request were received.

63. The method as recited in claim 61, wherein the first request comprises a write request, and wherein the act of transmitting the communication to the source node is performed when the act of servicing the write request has reached a memory commit point.

64. The method as recited in claim 63, wherein the communication comprises a Target Done response, and wherein the method comprises the act of generating the Target Done response by the target node.

65. The method as recited in claim 63, wherein the act of servicing the first request comprises the act of determining whether data corresponding to the first memory address is cached at any of the plurality of nodes.

66. The method as recited in claim 65, wherein the act of serving the first request has reached the memory commit point when the act of determining whether data corresponding to the first memory address is cached at any of the plurality of nodes is complete.

67. The method as recited in claim 65, wherein the act of determining whether data corresponding to the first memory address is cached at any of the plurality of nodes comprises the acts of:

issuing a probe directed to each of the plurality of nodes; and

issuing, by each of the plurality of nodes, a cache response in response to the probe, each cache response being directed to the target node and indicating whether data corresponding to the first memory address is cached at the particular node.

68. The method as recited in claim 67, wherein the memory commit point is reached when all of the cache responses have been received by the target node.

69. The method as recited in claim 62, wherein the first request comprises a read request, and wherein the communication transmitted to the source node comprises a plurality of responses issued from the plurality of nodes.

70. The method as recited in claim 69, wherein the plurality of responses comprises a memory access response issued from the target node, and wherein the act of servicing the first request comprises the acts of:

accessing, by the target node, a memory location associated with the first memory address;

transmitting to the source node the memory access response based on the act of accessing by the target node; and

determining whether data corresponding to the first memory address is cached at any of the plurality of nodes.

71. The method as recited in claim 70, wherein the plurality of responses comprises a plurality of cache responses issued by the plurality of nodes, and wherein the act of determining whether data corresponding to the first memory address is cached at any of the plurality of nodes comprises the acts of:

issuing a probe directed to each of the plurality of nodes; and

issuing, by each of the plurality of nodes, one of the cache responses in response to the probe, each of the cache responses being directed to the source node.

72. The method as recited in claim 71, wherein if a first node of the plurality nodes is caching data corresponding to the first memory address, the method comprises the acts of:

issuing, by the first node, a memory cancel response directed to the target node; and

formatting the cache response issued from the first node to indicate the act of issuing the memory cancel response.

73. The method as recited in claim 72, comprising the act of canceling the act of accessing the memory location in response to the memory cancel response.

74. The method as recited in claim 72, comprising the act of:

formatting the source response to indicate the act of issuing the memory cancel response; and

wherein the act of stalling service of the second request is stalled pending receipt of the memory cancel response by the target node.

75. A communication node for a distributed communication system comprising a plurality of communication nodes interconnected by a plurality of communication links, the node comprising:

a memory controller to control access to a memory, the memory comprising a plurality of memory locations corresponding to a plurality of memory addresses;

an interface configured to connect to a communication link; and

communication logic coupled to the memory controller, and the interface, wherein the communication logic is configured to:

store a first request received from a source via the interface, the first communication being directed to a first memory address of the plurality of memory addresses;

store a second communication directed to the first memory address;

generate a first response directed to the source in response to the first request; and

stall the second request pending receipt from the source of a second response in response to the first response.

76. The communication node as recited in claim 75, comprising:

a processor; and

a cache to store data, the cache being coupled to the processor and the communication logic; and

wherein the communication logic comprises a buffer configured to store the first request and the second request in the order received.

77. The communication node as recited in claim 75, wherein the communication logic is configured to generate a probe for transmission to each of the plurality of communication nodes in the distributed communication system, the probe to determine whether data corresponding to the first memory address is cached at any of the plurality of communication nodes.

78. The communication node as recited in claim 77, wherein the first request comprises a write request, and wherein the communication logic is configured to receive a plurality of cache responses in response to the probe, each cache response indicating whether data corresponding to the first memory address is cached at a particular

communication node of the plurality of communication nodes in the distributed communication system.

79. The communication node as recited in claim 78, wherein the communication logic is configured to generate the first response directed to the source when all of the plurality of cache responses to the probe have been received.

80. The communication node as recited in claim 79, wherein the first response comprises a Target Done response.

81. The communication node as recited in claim 77, wherein the first request comprises a read request, and wherein the communication logic is configured to issue the read request to the memory controller to access the memory location corresponding to the first memory address.

82. The communication node as recited in claim 81, wherein the first response comprises a read response in response to the access to the memory location.

83. The communication node as recited in claim 81, wherein the communication logic is configured to cancel the access by the memory controller to the memory location in response to a memory cancel response received from a particular communication node of the plurality of communication nodes, the memory cancel response indicating that the particular communication node is caching data corresponding to the first memory address.

84. The communication node as recited in claim 83, wherein the communication logic is configured to:

determine, based on the second response received from the source, whether the memory cancel response was issued; and

stall the second request pending receipt of the memory cancel response.

85. The communication node as recited in claim 75, wherein the second response comprises a Source Done response.

86. The communication node as recited in claim 75, wherein the communication logic comprises packet-based communication logic.

87. A distributed communication system, comprising:

a plurality of nodes, the plurality of nodes comprising a source node and a target node;

a plurality of communication links interconnecting the plurality of nodes; and

a memory accessible by the plurality of nodes, the memory comprising a plurality of memory locations corresponding to a plurality of memory addresses, wherein each of the plurality of nodes is configured to control access to a portion of the memory locations;

wherein the source node is configured to dispatch a first request directed to a first memory address accessible by the target node;

wherein the target node is configured to transmit a first response to the source node in response to the first request;

wherein the source node is configured to transmit a second response to the target node in response to the first response; and

wherein the target node is configured to stall service of a second request directed to the first memory address pending receipt of the second response.

88. The system as recited in claim 87, wherein the first request is associated with a first transaction, and wherein the source node is configured to stall dispatch of a second transaction pending receipt of the first response.

89. The system as recited in claim 87, wherein the first request comprises a write request, and wherein the target node is configured to transmit the first response when the first request reaches a memory commit point.

90. The system as recited in claim 87, wherein each of the plurality of nodes comprises a cache to store data, and wherein the target node is configured to issue a probe in response to the first request, the target node directing the probe to each of the plurality of nodes to determine whether data corresponding to the first memory address is stored in the cache of any of the plurality of nodes, and wherein each of the plurality of nodes is configured to issue a cache response in response to the probe, the cache response indicating whether data is stored in the cache of the respective node.

91. The system as recited in claim 90, wherein the target node is configured to format the probe, based on the first request, such that the probe identifies a destination for the plurality of cache response.

92. The system as recited in claim 91, wherein the target node formats the probe to identify the target node as the destination if the first request comprises a write request.

93. The system as recited in claim 91, wherein the target node formats the probe to identify the source node as the destination if the first request comprises a read request.

94. The system as recited in claim 93, wherein if the first request comprises a read request, the target node issues the first response directed to the source node after all of the cache responses are received by the target node.

95. The system as recited in claim 92, wherein if the first request comprises a write request, the source node issues the second response directed to the target node after all of the caches responses and the first response are received by the source node.

96. The system as recited in claim 90, wherein the first request comprises a read request, and wherein a first node of the plurality of nodes is configured to issue a memory cancel response directed to the target node if the first node is storing data corresponding to the first memory address in its cache.

97. The system as recited in claim 96,

wherein the first node is configured to format the respective cache response to indicate that the first node has issued the memory cancel response;

wherein the source node is configured to format the second response to indicate issuance of the memory cancel response based on the cache response; and

wherein, in response to the second response, the target node is configured to stall the second request pending receipt of the memory cancel response.

98. The system as recited in claim 96, wherein the target node is configured to cancel the access to the memory location corresponding to the first memory address in response to the memory cancel response.

99. The system as recited in claim 87, wherein the source node comprises a host bridge.

Please cancel claim 1.

REMARKS

By this Preliminary Amendment, claims 44-99 have been added, and original claim 1 has been canceled. Examination of the new claims is respectfully requested. Should the Examiner believe that a telephonic interview will help speed the application toward allowance, the Examiner is invited to contact the undersigned at (281)970-4545.

Respectfully submitted,

Date: April 23 2007

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